CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

8260.44A CHG 1

6/4/01

SUBJ: Civil Utilization of Area Navigation (RNAV) Departure Procedures.

1. PURPOSE. This change transmits revised pages to Order 8260.44A, Civil Utilization of Area Navigation (RNAV) Departure Procedures.

2. DISTRIBUTION. This order is distributed in Washington Headquarters to the branch level in the Offices of Airport Safety and Standards and Communications, Navigation, and Surveillance Systems; Air Traffic, Airway Facilities, and Flight Standards Services; to the National Flight Procedures Office and the Regulatory Standards Division at the Mike Monroney Aeronautical Center; to branch level in the regional Flight Standards, Airway Facilities, Air Traffic, and Airports Divisions; special mailing list ZVS-827, and to Special Military and Public Addressees.

3. EXPLANATION OF CHANGES. This change adds the phrase "within the United States" to paragraph 1.1; adds a note to figure 2 concerning wind drift; and adds a note to figure 3 to explain the terms "course" or "track" when referring to TF legs. It also adds a new paragraph 7.1.1 to explain how the RNP values apply to equipment suffixes; renumbers old paragraphs 7.1.1, 7.1.2, and 7.1.3 to 7.1.2, 7.1.3, and 7.1.4; modifies paragraphs 9.2.1 and 9.2.2 to include RNP values; and changes the "less than 230 KIAS for Category D aircraft" to less than 220 KIAS for paragraph 11.1.1.

4. DISPOSITION OF TRANSMITTAL. This transmittal sheet must be retained until it is canceled by a new directive.

PAGE CONTROL CHART

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Nicholas A. Sabatini
Director, Flight Standards Service

Distribution: A-W(AS/ND/AT/AF/FS)-3; AVN-100 (150 CYS); AMA-200 (80 CYS); A-X(FS/AF/AT/AS)-3; ZVS-827; Special Military and Public Addressees

Initiated By: AFS-420

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ORDER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

8260.44A CHG 1

6/4/01

SUBJ: CIVIL UTILIZATION OF AREA NAVIGATION (RNAV) DEPARTURE PROCEDURES

1.1 PURPOSE. This order, in conjunction with Orders 8260.3B, United States Standard for Terminal Instrument Procedures (TERPS); 8260.38A, Civil Utilization of Global Positioning System (GPS); 8260.40B, Flight Management System (FMS) Instrument Procedures Development; 8260.46, Instrument Departure Procedure (DP) Program; and 8260.48, Area Navigation (RNAV) Approach Construction Criteria, provides criteria for constructing instrument flight rules (IFR) RNAV departure procedures within the United States.

2.1 DISTRIBUTION. This order is distributed in Washington Headquarters to the branch level in the Offices of Airport Safety and Standards and Communications, Navigation, and Surveillance Systems; Air Traffic, Airway Facilities, and Flight Standards Services; to the National Flight Procedures Office and the Regulatory Standards Division at the Mike Monroney Aeronautical Center; to branch level in the regional Flight Standards, Airway Facilities, Air Traffic, and Airports Divisions; special mailing list ZVS-827, and to Special Military and Public Addressees.

3.1 CANCELLATION. Order 8260.44, Civil Utilization of Area Navigation (RNAV) Departure Procedures, dated October 20, 1997, is canceled.

4.1 EFFECTIVE DATE: May 12, 2000.

5.1 EXPLANATION OF CHANGES.

5.1.1 Paragraph 6.1.11. Describes RNAV leg types.

5.1.2 Paragraph 7.1. Divides new levels of criteria into three classifications.

5.1.3 Paragraphs 9.1 – 9.11. Clarifies criteria for waypoint (WP) substitution and charting instructions, provides WP definition and WP course changes with illustrations, and modifies minimum leg length. Adds fix displacement values for Level 2 criteria and a new table for fly-over WP minimum turn distance.

5.1.4 Paragraph 10.1. Modifies initial climb area, and adds criteria for a WP less than 2 nautical miles (NM) from departure end of runway (DER).

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Initiated by: AFS-420

5.1.5 Paragraphs 12.3 – 12.4. Modifies expansion of Level 1 criteria 30 NM from the airport reference point (ARP). Clarifies criteria for turns 90° or greater, successive fly-over WP's with turns less than 90°, "direct to fix" legs, and "fly-by to fly-over" WP's. Adds criteria for "direct to fix" leg of more than 120°.

5.1.6 Paragraph 13.2. Clarifies criteria when departure merges with airways.

5.1.7 Paragraphs 15.2 – 15.4. Clarifies obstacle evaluation criteria and adds illustrations.

5.1.8 Paragraph 16.1. Provides criteria for climb gradients in excess of 200 feet per NM, a new formula for computing climb gradients (this increases the ROC and provides a greater margin of safety), and an example showing computation of the new gradient formula.

6.1 DEFINITIONS.

6.1.1 Baseline. A line perpendicular to the course line at the latest position of the fix displacement tolerance area, used for construction of turn area expansion arcs.

6.1.2 Climb-in-Hold (CIH). Climbing in holding pattern.

6.1.3 Departure Altitude. An altitude at the end of the departure evaluation area that satisfies the requirements for en route operations. This term is similar in concept to the "missed approach altitude."

6.1.4 Departure End of Runway (DER). The end of runway declared available for the ground run of an aircraft departure.

6.1.5 Distance of Turn Anticipation (DTA). A distance preceding a fly-by waypoint (WP) at which an aircraft is expected to start a turn to intercept the course of the next segment.

6.1.6 Fly-By WP. A waypoint where a turn is initiated prior to reaching it.

6.1.7 Fly-Over WP. A waypoint over which an aircraft is expected to fly before the turn is initiated.

6.1.8 Initial Climb Area (ICA). A segment starting at the DER which allows the aircraft sufficient distance to reach an altitude of 400 feet above the DER.

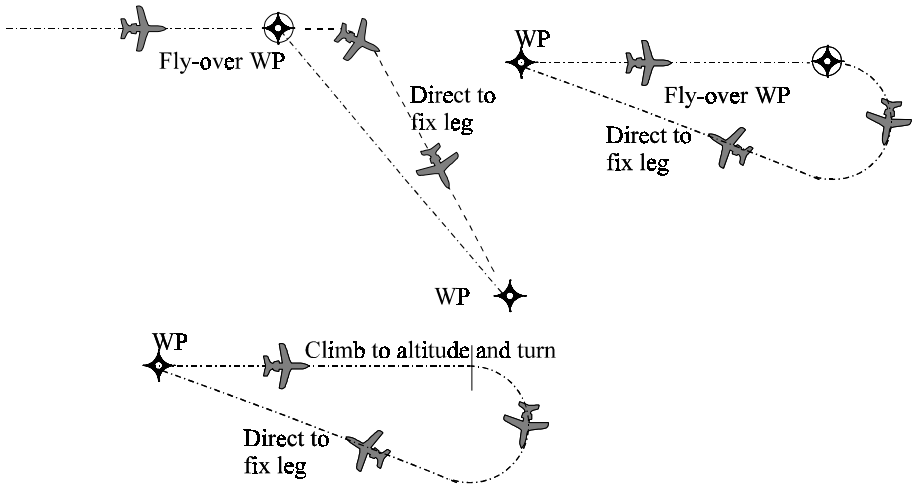
6.1.9 Initial Course. The course established initially after take-off beginning at the DER.

6.1.10 Initial Course Waypoint (ICWP). A waypoint established on the initial course denoting the start of positive course guidance (PCG).

6.1.11 RNAV Leg (Segment) Types.

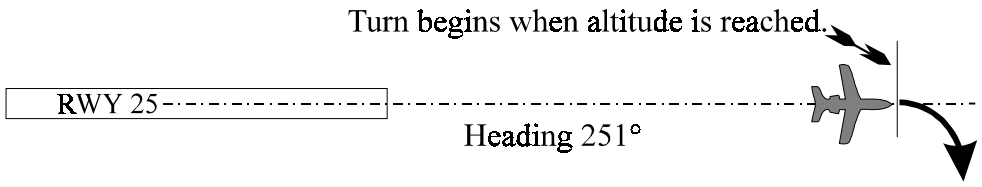
6.1.11 a. Direct to Fix (DF). A segment following a fly-over WP, climb to altitude, or radar vector, in which the aircraft's track is direct to the next WP (see figure 1).

Figure 1. DF Legs



6.1.11 b. Heading to an Altitude (VA). After departing the runway, a segment allowing the aircraft to climb to an altitude on a specified heading (see figure 2).

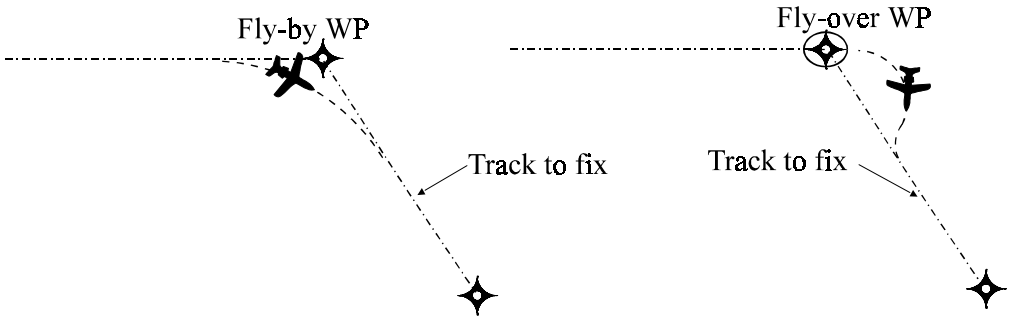
Figure 2. VA Leg



NOTE: Since this is a heading leg, the aircraft will be subject to wind drift.

6.1.11 c. Track to Fix (TF). A geodesic path between WP's which is intercepted and acquired as the flight track to the following WP. Applies to fly-by and fly-over WP's as shown individually in figure 3.

Figure 3. TF Legs



NOTE: TF legs are typically computed in RNAV equipment as a geodesic path referenced to true north. However, a magnetic variation is also generally applied by the navigation system for presentation to the pilot. Since aeronautical charts and airborne displays primarily depict magnetic cources, this document will use the terms "course" or "track" when referring to TF legs rather than the more technically correct "geodesic path."

6.1.11 d. Obstacle Clearance Surface (OCS). A surface where obstacle penetrations are not allowed.

6.1.11 e. Reference Line. A line parallel to the course line, following a turn waypoint (TWP), used to construct a second set of expansion arcs.

6.1.11 f. Reference Waypoint. A point of known location used to geodetically compute the location of another WP.

6.1.11 g. Turn Anticipation. The capability of RNAV airborne equipment to determine the location of the point along a course, prior to a "fly-by waypoint" which has been designated a TWP, where a turn is initiated to provide a smooth path to intercept the succeeding course.

6.1.11 h. TWP. A waypoint, Fly-by, or Fly-over denoting a course change. Synonymous with turning waypoint.

7.1 LEVELS OF CRITERIA AND STANDARD REQUIRED NAVIGATION PERFORMANCE (RNP) LEVELS. These criteria are divided into three classifications: Levels 1, 2, and 3. Each level is associated with an RNP value: 1.0, 2.0, and 0.3 respectively. Use the appropriate aircraft equipment suffixes defined in the Aeronautical Information Manual (AIM), along with the standard values of RNP and supporting RNAV routes and procedures, to specify the following criteria:

7.1.1 Level 1 (RNP 1.0) applies to equipment suffixes :

7.1.1 a. /E and /F flight management systems which perform a navigation system update at a known position 30 minutes prior to takeoff.

7.1.1 b. /G GPS-equipped aircraft whose selectable course deviation indicator (CDI) is set to terminal sensitivity of 1 nautical mile (NM). Without a selectable CDI, the aircraft must be equipped with a flight director.

7.1.l c. /R Required Navigation Performance (RNP 1.0). Eligible aircraft are those with an Aircraft Flight Manual (AFM) or AFM Supplement which states the RNAV equipment is approved for RNP 1.0 operations. Any limitation or specific requirement needed to maintain RNP 1.0 shall be adhered to.

7.1.2 Level 1 criteria is an option and may be used only under the following conditions:

7.1.2 **a. Environmental conditions or offending obstacles** warrant the use of more restrictive criteria than "Level 2" and thus excludes some RNAV-equipped aircraft.

7.1.2 **b. The procedure applies only to /G equipped aircraft** with the restrictions noted in paragraph 7.1.1b.

7.1.2 **c. Level 1 departure criteria** must be applied as the missed approach criteria for Order 8260.48.

7.1.3 **Level 2 (RNP 2.0) applies to equipment suffixes /E, /F, /G, and /R** as defined in the AIM. Level 2 criteria shall be applied, unless environmental or obstacle considerations require the use of Levels 1 or 3.

7.1.4 **Level 3 (RNP 0.3) applies to equipment suffixes /E and /F,** with navigation system update at runway prior to departure. Do not use the criteria in this order. Apply Order 8260.40. Special authorization for a Level 3 procedure is required through Flight Standards Service or appropriate military authority.

SECTION 1. GENERAL CRITERIA

8.1 **APPLICATION.**

8.1.1 **Apply diverse departure criteria** contained in Order 8260.3 to determine if RNAV departure procedures are required to avoid obstacles.

8.1.2 **Develop RNAV departure procedures** to satisfy operational, air traffic, or environmental requirements.

9.1 **THESE CRITERIA ESTABLISH DESIGN STANDARDS** for development of RNAV instrument departure procedures and provide flexibility so the procedures designer can select an appropriate level of criteria, waypoint type (fly-by, fly-over), and leg types (DF, TF, and VA). The procedures designer should work closely with user groups and air traffic to ensure that appropriate design tools (i.e., levels, WP types, leg types) are selected to meet user requirements.

9.1.1 **Waypoint Substitution.** An existing fix/navigational aid (NAVAID) should be substituted for an RNAV WP where conveniently located. For purposes of simplicity in these criteria, the term WP will be used to denote a fix.

9.1.2 **Fix Displacement Tolerance (FDT).** Terminal FDT applies to Level 1 criteria. Use where the plotted position of the WP is at or within 30 NM straight-line measurement of the departure airport's reference point (ARP). Level 1 en route FDT applies beyond 30 NM from the ARP, including succeeding WP's that may lie within 30 NM of the ARP should the route return to the area. En route FDT applies to Level 2 criteria throughout the procedure. The FDT area shall not contain an adjacent WP. Use table 1 for application of the appropriate FDT.

TABLE 1

FIX DISPLACEMENT TOLERANCE (NM)		
	LEVEL 1 CRITERIA	
	EN ROUTE	**TERMINAL**
XTRK	**2**	**1**
ATRK	**0.5**	**0.5**
	LEVEL 2 CRITERIA	
	EN ROUTE	**TERMINAL**
XTRK	**2.8**	**N/A**
ATRK	**2**	**N/A**

9.1.3 Waypoints (WP). " Fly-by waypoints" are preferred in most situations. Use "fly-over waypoints" when operational requirements dictate or an advantage is achieved. Document the fix use and status of a waypoint as "fly-by" or "fly-over" on the associated FAA Form 8260-15B in accordance with Order 8260.19. Establish WP's to designate course restrictions/changes and altitude restrictions/changes when necessary.

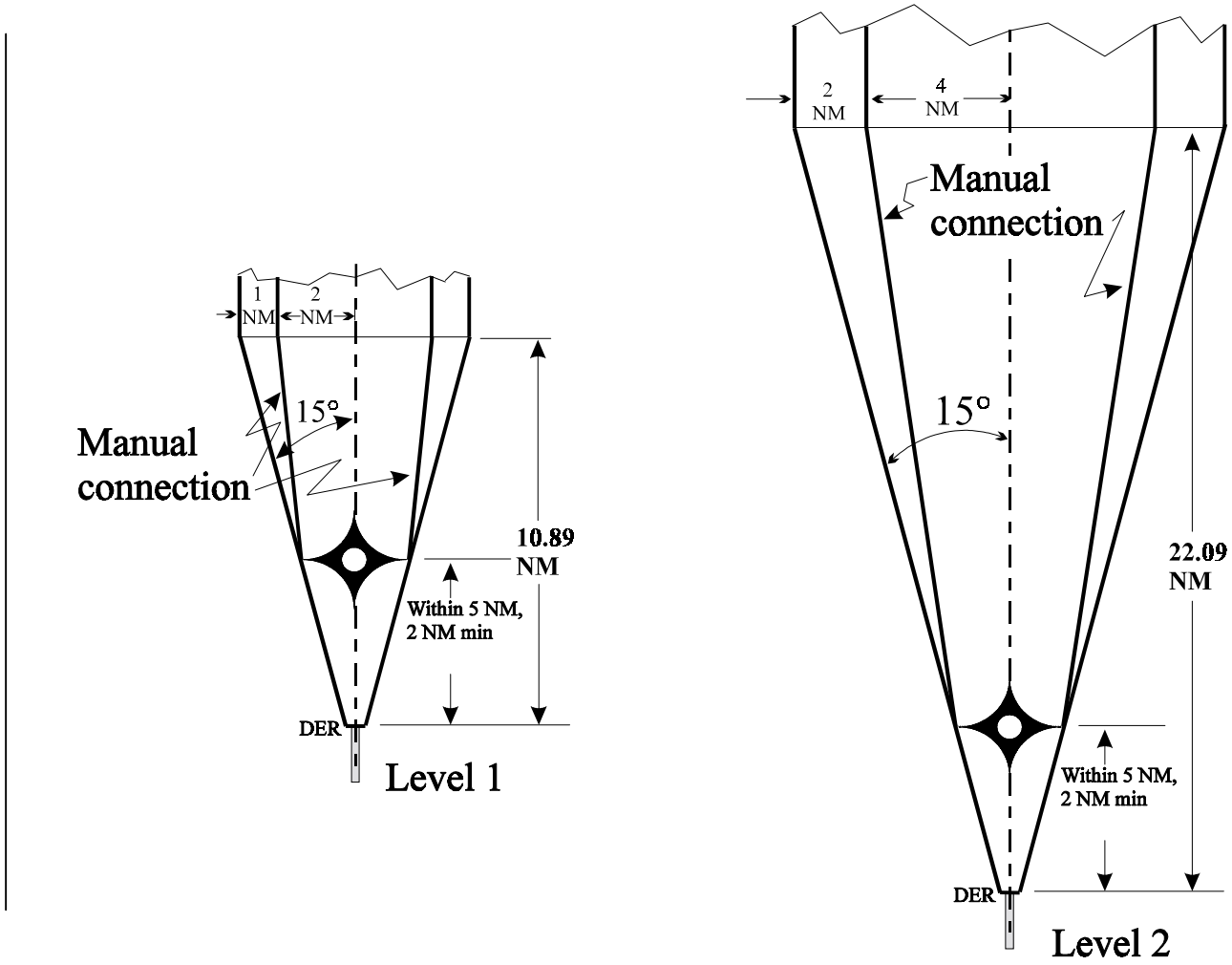
9.2 CHARTING INSTRUCTIONS. Chart all RNAV departures graphically. Place a note on the departure graphic describing a specific criteria level:

9.2.1 Level 1: "For use by /E, /F, /R (RNP 1.0), and /G-equipped aircraft. (1) /E and /F aircraft are required to update navigation system at a known location within 30 minutes prior to takeoff. (2) /G aircraft with selectable CDI must set CDI to 1 NM terminal sensitivity. Aircraft without selectable CDI must use flight director."

9.2.2 Level 2: "For use by /E, /F, /R (RNP 2.0), and /G-equipped aircraft."

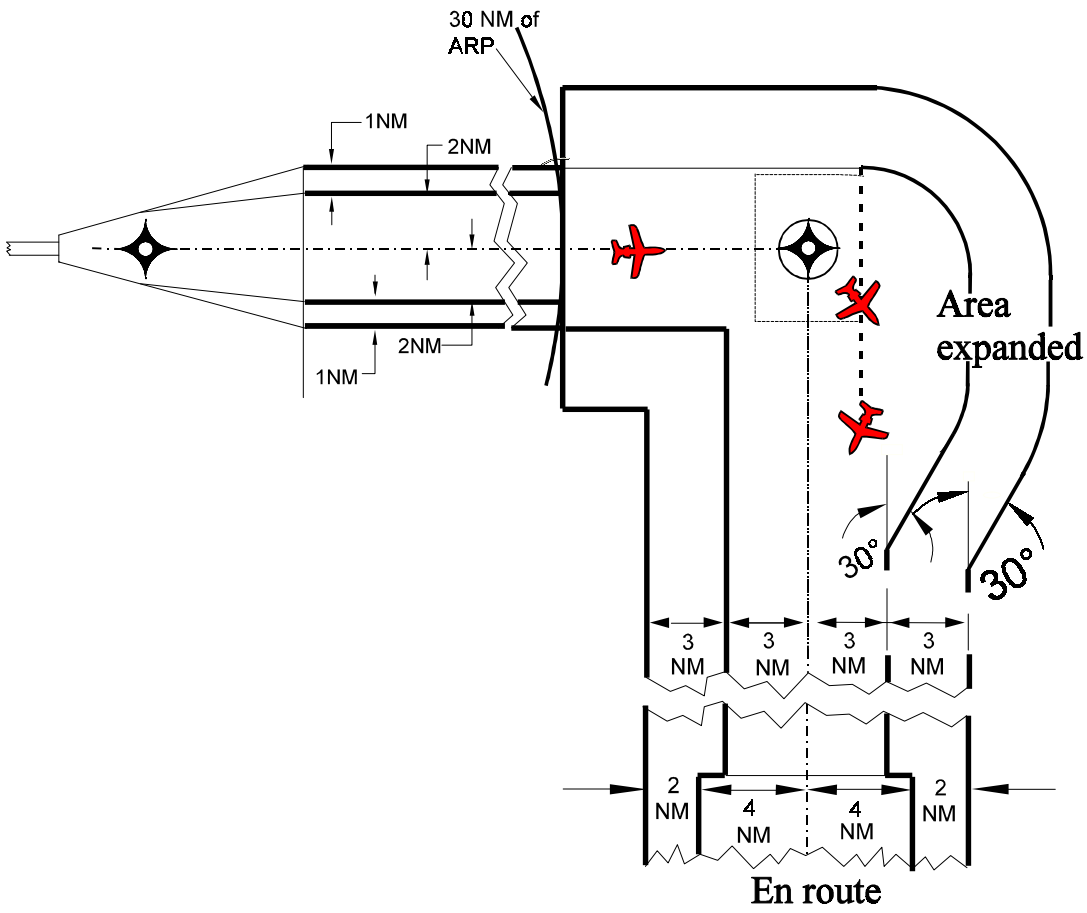
9.3 WAYPOINT DEFINITION. Define departure WP's on runway centerline extended by establishing coordinates using the reciprocal of the opposite direction runway true bearing and the appropriate distance applied from the DER (reference point). Where two or more segments are aligned along a continuous geodetic line, align and construct all succeeding WP's based on a true bearing and distance from the first reference waypoint in the sequence. Where turns are established, use the TWP as the reference WP to construct succeeding WP's and segments aligned on a continuous geodetic line following the turn (see figure 4).

Figure 13. Area Splays to Basic Widths



10.2.1 **Once the departure segment splays to the respective primary and secondary area widths,** the area widths remain constant except for the following: expansion of areas when a turn is involved; a course in Level 1 criteria reaches a point 30 NM from ARP; and the course in Level 1 reaches the en route structure (see figure 14).

Figure 14. 90° Turn, Fly-Over at more than 30 NM from ARP



10.2.2 **DEVELOP A ROUTE** using Level 1 or Level 2 basic primary and secondary areas as outlined in paragraph 9.12. Specify WP's as common fixes (see figure 14).

11.1 **AIRCRAFT SPEEDS AND ALTITUDES.** Refer to table 3.

11.1.1 **For all turns below 10,000 feet MSL,** use 250 KIAS unless a lower or higher speed has been authorized. If a speed other than 250 KIAS is used, the speed restriction shall be noted on the procedure. Do not use a speed less than 200 KIAS for Category C or 220 KIAS for Category D aircraft.

11.1.2 **For turns at 10,000 feet MSL and above**, use 310 KIAS, unless a higher airspeed has been authorized by air traffic. If a lower speed is used, a speed restriction not less than 250 KIAS above 10,000 through 15,000 feet shall be noted on the procedure for that turn. Above 15,000 feet, no speed reduction below 310 KIAS is permitted.